EXECUTIVE SUMMARY

Overview

This risk assessment has analyzed considerable amounts of data from over three years of remedial and closure activities and concludes that human health and the environment will be adequately protected following the completion of the remediation activities discussed in more depth in the *NIROP Site Investigation and Remediation Summary Report* (Tetra Tech, 1996) for the Naval Industrial Reserve Ordnance Plant (NIROP) in Pomona, CA, if the site is maintained as an industrial facility. Human health and the environment will also be adequately protected in major areas of the facility, if it is developed for unrestricted, residential uses. The *NIROP Site Investigation and Remediation Summary Report* focuses on the history of site assessment and remedial activities. This report, in contrast, analyzes the human health and environmental risks following completion of cleanup. When viewed as a whole, remedial activities at NIROP have achieved low concentrations of residual compounds that are below levels of regulatory concern for industrial redevelopment or reuse and, in many areas, residual concentrations are below levels of regulatory concern for unrestricted, residential use. Residual compounds at NIROP also represent negligible ecological risks.

As requested by the Department of Toxic Substances Control (DTSC) in September 1995, this risk assessment follows the procedures outlined in the memorandum *"Using U.S. EPA Region IX PRGs in Screening Risk Assessments at Military Facilities"* (DTSC, 1994). On this basis, the risk assessment consists of three primary components: (1) human health risk analyses supported by comparisons of current U.S. EPA Region IX Preliminary Remediation Goals (PRGs) with concentrations of chemicals, if any, in soil and groundwater at NIROP; (2) evaluations of the potential for compounds detected in soil to migrate and pose a risk to groundwater; and (3) a qualitative ecological risk assessment that conforms to DTSC's *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities* (DTSC, 1994).

Soil Risk

For soils, chemical concentrations are compared to the industrial worker and residential PRGs. Industrial worker PRGs are used because the property is zoned for industrial purposes, the Navy intends to transition the surplus property to the public and/or private sectors for industrial redevelopment, and industrial PRGs more reasonably reflect future land uses. Residential PRGs are used to demonstrate the areas that could currently be developed for unrestricted, residential uses. Based on the findings, all of the organic compounds in soils have either been remediated (i.e., excavated) or occur at concentrations substantially less than industrial worker and residential PRGs. Indeed, the maximum ratio of detected concentrations in soil to applicable U.S. EPA PRGs is 0.001 for potentially carcinogenic organic compounds. In regard to the NIROP wastewater treatment plant, for example, the PRG comparisons for organic compounds have been estimated to represent a risk probability for an industrial worker of approximately 4×10^{-9}, a risk probability substantially less than the limits typically deemed acceptable by DTSC. Furthermore, the noncarcinogenic hazard indices (HIs) for organic compounds detected in soils are estimated to be substantially less than the criterion of potential health concern, e.g., a HI of 1.

The majority of metals detected in subsurface soils at the NIROP facility occurs at concentrations that do not exceed the industrial worker or residential PRGs. Based on the most recent data obtained from all site investigations and remedial actions, only arsenic, beryllium, and hexavalent chromium concentrations may exceed their respective industrial worker or residential PRGs at 17 locations. The 17 locations include:

1. Building 2 - Machine Shop - North
2. Building 2 - Machine Shop - South
3. Building 2 - Mechanical Assembly Room
4. Building 2 - Plasma Desmear Area
5. Building 2 - General Heat Treat Area
6. Building 2 - Chrome Line Area (Department 52)
7. Building 2 - Department 62
8. Building 4 - Old Machine Shop
9. Building 4 - Former R&D Lab
10. Building 4 - Structural Test Lab
11. Building 4 - Old Photo Shop
12. Building 4 - Former Quench Tank
13. Building 14/14A - Parking Lot
14. Building 27 - North Side
15. Building 42 - Antenna Range
16. Building 43 - Chemical Storage
17. Overpass Area - Corona Expressway

There is little information available to indicate whether beryllium or arsenic may have been used in prior industrial practices at the facility, although these could possibly have been components of metal processing solutions used in certain areas of the facility. Because of this concern, this risk assessment addresses whether these two metals are elevated above levels observed in ambient Pomona soils, particularly in those areas where these metals are slightly to moderately elevated above onsite background levels. Only nine of the areas listed above have maximum arsenic or beryllium concentrations that exceed the 95th percentile of ambient Pomona background concentrations. Furthermore, it is plausible that the measured maximum concentrations of arsenic and beryllium may be within the upper five percent of the background distributions for each of these metals, except for beryllium concentrations greater than 5 mg/kg. The three areas with beryllium concentrations greater than 5 mg/kg are as follows:

1. Building 4 - Old Machine Shop
2. Building 4 - Former R&D Lab
3. Building 4 - Structural Test Lab

The measurements of arsenic and beryllium taken in the other areas of the facility can probably be considered to be indicative of unimpacted soils.

Nevertheless, although the estimated concentrations of arsenic and beryllium in soils may exceed the industrial worker PRGs in these 17areas, potential exposure to these two metals represents carcinogenic health risks that are within potentially acceptable limits, i.e., risks of 1 x 10^{-6} to 1 x 10^{-4} (U.S. EPA, 1990). Also, to put this into perspective, the potential risks posed by arsenic and beryllium Pomona ambient background concentrations are within this risk range. For example, the carcinogenic risks to a hypothetical resident from exposure to background concentrations of arsenic (9.1 mg/kg) and beryllium (1.1 mg/kg) are, respectively, 2.4 x 10^{-5} and 8 x 10^{-6}. Thus, it is possible that only risks greater than these levels differ from background conditions. Additionally, all of the noncarcinogenic HIs estimated for potential exposures of workers and hypothetical residents to individual metals in subsurface soils are less than 1. Based upon these determinations of potentially acceptable health risks for future industrial workers and hypothetical residents, and given that concrete building slabs and paving are likely to substantially limit soil contact (making the exposure assumptions very conservative), no further action is proposed for remediation of these two metals in subsurface soils.

Hexavalent chromium concentrations measured in three locations in Building 2 exceed the potentially applicable industrial worker and residential PRGs: Department 52, Department 62 - Western Sump, and Department 62 - Wastewater Sump. Hexavalent chromium concentrations in the latter area exceed only the residential PRG, whereas the concentrations remaining in the other two areas exceed both PRGs. However, all concentrations are less than the DTSC-approved cleanup goal (5 mg/kg) achieved during remediation of Departments 52 and 62. Therefore, no further action is proposed for these areas.

Groundwater Characterization

With respect to groundwater pathways, the Regional Water Quality Control Board (RWQCB) has determined, on the basis of the groundwater monitoring reports and the depth to groundwater, that the presence of VOCs in groundwater at NIROP "may be a regional problem not originating from onsite sources." Furthermore, in October 1995, the RWQCB approved the abandonment of the onsite monitoring wells and determined that no further action at this time was necessary for groundwater at the facility (RWQCB, 1995c). Based on the available data, this risk assessment also concludes that residual compounds in soils beneath building floors and paving at NIROP do not represent a risk to groundwater.

Ecological Risk

The qualitative ecological risk assessment discussed herein has found that the facility has no sensitive terrestrial habitats and only marginal to poor terrestrial wildlife habitat (see Section 6). The facility supports no ecological, commercial, or recreational receptors of concern. No special status species have been observed within the area immediately surrounding the facility. Based on available information, there is no evidence of complete routes of exposure of the biota to the organic compounds or metals detected beneath the buildings or paved areas of the facility. Therefore, there are negligible ecological risks posed by compounds detected at NIROP.

Conclusion

In conclusion, this risk assessment supports the proposal that no further action is warranted for residual compounds at NIROP because (1) all organic compounds in soil are substantially below their respective industrial worker and residential PRGs; (2) the metals arsenic, beryllium, and hexavalent chromium occur at concentrations in soil that are within potentially acceptable health risks, i.e., 1×10^{-6} to 1×10^{-4} (U.S. EPA, 1990), and, in the case of chromium, meet DTSC-approved cleanup goals; (3) residual organic compounds and metals are not likely to pose a risk of future migration to groundwater; (4) the RWQCB has approved abandonment of the groundwater monitoring wells and has determined that no further action is necessary at this time for evaluation of groundwater at the facility (RWQCB, 1995c); and (5) there is no evidence that sensitive biota may be exposed to residual chemicals underneath buildings and site paving, and therefore ecological risks at the facility are negligible. Thus, remediated soils and groundwater at the NIROP facility should adequately protect human health and the environment under industrial conditions and, in all but three areas of Building 4, may also protect unrestricted, residential use.

TECHNICAL SUMMARY

Overview

This risk assessment concludes that human health and the environment will be adequately protected following the completion of the site investigation and the remediation activities discussed in depth in the *NIROP Site Investigation and Remediation Summary Report* (Tetra Tech, 1996) for the Naval Industrial Reserve Ordnance Plant (NIROP) in Pomona, CA, if the site is maintained or redeveloped as an industrial facility. Human health and the environment will also be adequately protected in much of the facility, if it is developed for unrestricted, residential uses. As requested by the Department of Toxic Substances Control (DTSC) in September 1995, this risk assessment follows the procedures outlined in the memorandum on *"Using U.S. EPA Region IX PRGs in Screening Risk Assessments at Military Facilities"* (DTSC, 1994).

Construction of the NIROP facility began between 1951 and 1952. General Dynamics Corporation (GD) operated NIROP for the benefit of the U.S. Navy under a facilities use contract between 1953 and August 1992. The facility was used for the development and manufacture of prototypes of various advanced weapons systems. In August 1992, Hughes Missile Systems Company (HMSC) purchased GD's missile operations and became the site operator. HMSC began to phase out operations at this facility in 1992, shortly after the purchase. HMSC returned the facility to Navy control on December 31, 1994.

HMSC initiated extensive site investigation and remediation activities during the consolidation of its business activities. For at least the past three years, soil throughout the facility and the underlying groundwater have been sampled, first under the supervision of the Regional Water Quality Control Board (RWQCB), and for the past year principally under the supervision of DTSC. The potential for soil contamination has been examined with respect to more than 20 manufacturing and non-manufacturing buildings and several support structures (e.g., wastewater treatment plant) at the facility. Four monitoring wells have been installed and groundwater has been sampled up to seven times. The details of these extensive investigatory and remediation activities are described in the *NIROP Site Investigation and Remediation Summary Report* (Tetra Tech, 1996).

Remediation has primarily consisted of the excavation and offsite disposal of contaminated soil from beneath or adjacent to seven buildings (Buildings 2, 4, 7, 27, 38, 39, and 48) and the former salvage yard (metal chip storage). All of the soil remediation activities conducted under the supervision of the RWQCB have successfully achieved the designated cleanup goals, namely, residual total recoverable petroleum hydrocarbon (TRPH) concentrations of less than 1000 or 100 parts per million (ppm), as appropriate, and non-detectable concentrations of volatile and semi-volatile organic compounds (VOCs and SVOCs). Based on these results, the RWQCB (1995a, b) has determined that no further action is required for soil at Buildings 4, 7, 27, 38, and 39 and portions of Building 2 (machine shop).

Removal actions have recently been conducted in the following six areas:

1. Building 2 - Chrome Line Area (Department 52)
2. Building 2 - Plasma Desmear Area

3. Building 2 - Department 62
4. Wastewater Treatment Plant
5. Building 48 - Bulk Chemical Storage Area
6. Building 48 - Storage Bays

Remediation has achieved the DTSC-approved cleanup goals for soils in all areas.

Approach

The purpose of this risk assessment is to evaluate the site investigation and post-remediation site data and determine whether remediation activities when viewed as a whole have achieved conditions that are sufficiently protective of human health and the environment at the NIROP facility. The human health determinations are based primarily on comparisons of current U.S. EPA Region IX Preliminary Remediation Goals (PRGs) with concentrations of chemicals in soil and groundwater at NIROP. For soils, chemical concentrations are compared to the industrial worker PRGs because the property is zoned for industrial purposes, the Navy may transition the surplus property to the public and/or private sectors for industrial redevelopment, and the industrial PRGs more reasonably reflect future land uses. Residential PRGs are also used to demonstrate the areas that could currently be developed for unrestricted, residential uses. The comparisons basically consist of an analysis of the ratio between the maximum concentration of each chemical detected in soils and the applicable PRG; post-remediation chemical concentrations to evaluate areas of the facility where soil remediation is ongoing or is completed. The ratios are considered to be comparable to potential human health risks. A ratio of "1" for potential carcinogens represents a risk probability of 1×10^{-6}, and a ratio of "1" for potential noncarcinogens, or the noncarcinogenic health effects of carcinogens, represents a HI of 1. For metals, risk estimates are developed only for those metals exceeding naturally occurring concentrations measured at onsite DTSC-approved background soil sampling locations and, in addition, for arsenic and beryllium, levels considered to be ambient Pomona soil concentrations. Cumulative risks and HIs are developed for all organic chemicals and metals exceeding background concentrations that were detected in soils beneath each building or in each area of investigation within a building.

For groundwater evaluations, measured chemical concentrations are compared with U.S. EPA tap water PRGs. Human health risks are not calculated because 1) groundwater is not used at the facility and 2) the RWQCB has recently approved abandonment of the monitoring wells and is requiring no further action for groundwater at the facility (RWQCB, 1995c). Evaluations are also conducted herein to determine whether the residual metals and organic compounds in soil could potentially migrate to groundwater at concentrations representing potential human health concerns.

A qualitative ecological risk assessment has been undertaken to assess the potential for environmental risks at the NIROP facility. This screening level evaluation has been conducted according to DTSC's *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities* (DTSC, 1994). It identifies habitats and biological resources of concern at or near the facility and whether there is a reasonable chance that the identified resources of concern could be exposed to chemicals detected at the facility.

Results of the Soil Risk Characterization

Risk ratios and risk estimates have been developed for chemicals measured in soils beneath 20 manufacturing and non-manufacturing buildings and in various open areas at NIROP. These areas had been specified for further investigation as the result of Phase I assessments conducted by Versar (1994) and Woodward - Clyde (1994). Phase II investigations were not conducted for other buildings or areas of the facility where chemical compounds and metals were not stored or used. For risk assessment purposes, it is assumed that future industrial workers or hypothetical residents may contact soils on a regular basis, although this is a highly conservative assumption, given that almost the entire facility is covered by buildings with cement slab flooring or by paving. The risk estimates may be more meaningful if the buildings are eventually razed and all of the paving or cement is removed from the facility. In some cases, such as at the large manufacturing areas of Buildings 2 and 4, risk estimates are developed for various subareas within the buildings. The findings are summarized in Table ES-1.

Based on these findings, all of the organic compounds in soils have either been remediated (i.e., excavated) or occur at concentrations substantially less than industrial worker and residential PRGs. Specifically, the maximum ratio of detected concentrations in soil and applicable U.S. EPA PRGs is 0.001 for potentially carcinogenic organic compounds. For example, at the wastewater treatment plant, this risk ratio for organic compounds is comparable to a risk probability for an industrial worker of approximately 4×10^{-9} (see Table ES-1), a risk probability substantially less than the "point of departure" for DTSC, i.e., less than 1×10^{-6}. Furthermore, as shown in Table ES-1, the noncarcinogenic HIs for organic compounds detected in soils at all areas investigated are estimated to be equal to or less than 0.0003. This HI is substantially less than the criterion of potential health concern, or a HI of 1. These results demonstrate that health risks posed by organic compounds in soils at the NIROP facility are sufficiently protective of human health under industrial conditions and unrestricted, residential conditions. With respect to organic compounds, no further action is warranted.

Only three metals were detected at concentrations above their industrial worker or residential PRGs in any of the soil samples from the NIROP facility. Arsenic, beryllium, and hexavalent chromium have been detected above their respective industrial worker PRG concentrations in soil samples from 17 locations during Phase II investigations, including the recently completed remedial excavations. Verification samples were taken at each remediation area to demonstrate that the cleanup goals have been achieved (Tetra Tech, 1996).

No evidence exists linking arsenic or beryllium to prior industrial activities at NIROP. Potential sources, if any, of the apparently elevated concentrations of these metals detected at the site have not been determined.

Although the calculated concentrations for arsenic, beryllium, and chromium in soils may exceed their industrial worker PRGs at isolated areas beneath building floor slabs and paving, potential exposure to these three metals represents carcinogenic health risks that are within limits potentially acceptable to DTSC, or risks between 1×10^{-6} and 1×10^{-4} (U.S. EPA, 1990). Table ES-1 indicates that carcinogenic risks for potential industrial worker exposure to arsenic, beryllium, and hexavalent chromium in post-remediation soils are estimated to be within the range of 5×10^{-8} to 1.3×10^{-5}. Risks to hypothetical residents are estimated to be within the range of 1×10^{-7} to 9×10^{-5}.

Risks to industrial workers that approximated 1×10^{-5} were found in only two areas:

1. Building 4 - Old Machine Shop
2. Building 4 - Former R&D Lab

In both areas, the total risk estimates were influenced most by potential worker exposure to arsenic and/or beryllium. Carcinogenic risks from potential worker exposure to each of the individual metals did not exceed 7.5×10^{-6}. All of the noncarcinogenic HIs estimated for potential exposure of workers to metals in subsurface soils were less than 1; none was determined to exceed 0.3. Based upon these determinations of generally acceptable health risks for future industrial workers, and given that concrete floor slabs and paving are likely to substantially limit soil contact, no further action is proposed for remediation of metals in subsurface soils to maintain or use the NIROP facility for industrial purposes.

Carcinogenic risks for hypothetical residents potentially exposed to metals in post-remediation soil conditions are estimated to be within the range of 1×10^{-7} to 9×10^{-5}. Risks to the hypothetical resident greater than 1×10^{-6} were found for maximum arsenic and beryllium concentrations in nine discrete areas:

1. Building 2 -Machine Shop North
2. Building 2 - Mechanical Assembly
3. Building 2 - Department 62, Western Sump Area
4. Building 4 - Old Machine Shop
5. Building 4 - Structural Test Lab
6. Building 4 - Former R&D Lab
7. Building 4 - Old Photo Shop
8. Building 4 - Former Quench Tank
9. Building 43.

In a number of areas, the total risk estimates reflect a combination of potential exposure of hypothetical residents to both arsenic and beryllium. Carcinogenic risks from potential hypothetical residential exposure to each of the individual metals did not exceed 6×10^{-5}. To put this in perspective, the potential carcinogenic risks from background concentrations of arsenic (9.1 mg/kg) and beryllium (1.1 mg/kg) are, respectively, 2.4×10^{-5} and 8×10^{-6}. Thus, a risk greater than 1×10^{-6} may occur without necessarily elevated concentrations of arsenic or beryllium. In fact, except for the three areas in Building 4 with beryllium concentrations greater than 5 mg/kg, the measured maximum concentrations of arsenic and beryllium may be within the upper five percent of the background distributions of these metals and the majority of risks estimated for arsenic and beryllium may be considered to be indicative of unimpacted soils. The three areas with beryllium concentrations greater than 5 mg/kg are as follows:

1. Building 4 - Old Machine Shop
2. Building 4 - Structural Test Lab
3. Building 4 - Former R&D Lab

All of the noncarcinogenic HIs are less than 1 for hypothetical residents potentially exposed to individual metals in subsurface soils. Similar results were determined for the summation of HIs estimated for metal exposures potentially resulting in similar health effects. Thus, based on available data, soil conditions are sufficiently protective of human health for use of the facility for residential purposes in all but possibly the three areas of Building 4.

Results of the Groundwater Characterization

Four wells have been installed at the NIROP facility near a former sump in the salvage yard (metal chip storage northeast of Building 2), which indicate groundwater is encountered at depths of approximately 140 to 160 ft and flows locally toward the northwest. Eight organic compounds in the groundwater have exceeded the U.S. EPA Tap Water PRGs on one or more occasions. The source has not been identified, and may be upgradient of the NIROP facility. Based upon the groundwater monitoring reports and the depth to groundwater, the RWQCB has determined that the presence of VOCs in groundwater "may be a regional problem not originating from onsite sources." Furthermore, the RWQCB has approved the abandonment of the monitoring wells and has determined that no further action is necessary at this time for the facility (RWQCB, 1995c).

Based on the available data, residual organic compounds in the soils beneath the excavated areas do not represent a threat to the underlying groundwater. With respect to metals, post-remediation conditions in two areas of Building 2 are of potential interest: (1) the precision machine shop area has copper and lead above 10 times the soluble threshold limit concentration (STLC), which is designed to protect groundwater; and, (2) the deepest soil samples in Department 62 (Sumps and Trenches) have elevated copper concentrations that may not have been excavated during the recent removal action. Because these areas are underneath building slabs and metals are known to sorb strongly to soils under alkaline conditions, such as those found at the site, the metals are not likely to migrate or otherwise pose a risk to groundwater.

Results of the Ecological Risk Assessment

The qualitative ecological risk assessment undertaken at the facility found that NIROP once supported approximately 45 manufacturing and non-manufacturing buildings; the facility is completely paved, except for the Pomona Recreation Association (PRA) area located in the northwestern portion of the facility. There are also a few minor areas landscaped with grass and ornamental shrubs. There are no aquatic habitats on the facility.

The facility supports no natural, undisturbed terrestrial vegetation (see Section 6). The facility has no sensitive terrestrial habitats and only marginal to poor terrestrial wildlife habitat. Wildlife expected to be present at or near the facility are common urban species that are (1) tolerant of human activity and disturbance, (2) highly unlikely to be attracted to the paved areas of the facility, and (3) considered to be infrequent transient visitors to the facility. The facility supports no ecological, commercial, or recreational receptors of concern. No special status species have been observed within the area immediately surrounding the facility.

Any residual organic compounds or metals elevated above onsite background concentrations are either under concrete floors inside buildings or underneath paved areas and are not accessible to biota. Based on available information, there is no evidence of complete exposure routes to biota. Therefore, there are negligible ecological risks posed by compounds detected at this facility.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 1	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 2					
Machine Shop - North*	NR TRPH < 1000 mg/kg	Remediation Complete (RWQCB, 1995a)	I. Worker: HI=0.05 Risk=6E-6	– Arsenic=6E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			Resident: HI=0.96 Risk=4E-5	– Arsenic=4E-5	No Action Necessary Risks within range of 1E-6 to 1E-4
Machine Shop - South*	NR TRPH < 1000 mg/kg	Remediation Complete (RWQCB, 1995a)	I. Worker: HI=0.008	–	No Action Necessary
			Resident: HI=0.17	–	No Action Necessary
Precision Machine Shop*	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.16 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.36 Risk=4E-7	– –	No Action Necessary
Experimental Machine /Tool Manufacturing (EMM)*	NR TRPH < 1000 mg/kg	Remediation Complete (RWQCB, 1995a)	I. Worker: HI=0.006	–	No Action Necessary
			Resident: HI=0.13	–	No Action Necessary

Note:
I. Worker = Industrial Worker; Resident = Hypothetical Resident
NR = No residual organic compounds detected; NS = Not sampled; ND: Not detected
TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration
*Risk relative to maximum concentration in soils not excavated.
-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 2					
Mechanical Assembly Room*	TRPH < 10 mg/kg I. Worker: HI=0.00002	Remediation Complete (RWQCB, 1995a)	I. Worker: HI=0.014 Risk=3E-6	– Beryllium=2E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
	Resident: HI=0.00002		Resident: HI=0.31 Risk=2E-5	– Beryllium=2E-5	No Action Necessary Risks within range of 1E-6 to 1E-4
Robotic Paint Shop - Preparation Area*	NS - organics TRPH < 100 mg/kg	No Action Necessary	NS	–	No Action Necessary
Robotic Paint Shop - Paint Room	NR TRPH < 100 mg/kg	No Action Necessary	I. Worker: HI=0.006 –	–	No Action Necessary
			Resident: HI=0.13 –	–	No Action Necessary
Heat Treat - General Area	NR TRPH = NS	No Action Necessary	I. Worker: HI=0.025 Risk=1E-7	– –	No Action Necessary
			Resident: HI=0.43 Risk=3E-7	– –	No Action Necessary
Heat Treat - Degreaser Sump	NR TRPH < 10 mg/kg	No Action Necessary	I. Worker: HI=0.015 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.22 Risk=3E-7	– –	No Action Necessary
Heat Treat - Furnace Quench Sump	NR; TRPH = ND	No Action Necessary	I. Worker: HI=0.021 Risk=8E-8	– –	No Action Necessary
			Resident: HI=0.23 Risk=2E-7	– –	No Action Necessary

Note:
I. Worker = Industrial Worker; Resident = Hypothetical Resident
NR = No residual organic compounds detected.
NS = Not sampled; ND = Not detected
TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration
*Risk relative to maximum concentration in soils not excavated.
-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 2					
Chrome Line Area (Dept. 52) (Surface Process Area)	NR TRPH = NS	Remediation Complete	I. Worker: HI=0.024 Risk=9E-6	– Chromium (VI)=9E-6**	Achieved DTSC-approved cleanup goals
			Resident: HI=0.38 Risk=3E-5	– Chromium (VI)=3E-5**	Achieved DTSC-approved cleanup goals
Plasma Desmear Area	NR; TRPH = NS I. Worker: HI=0.00003	Remediation Complete	I. Worker: HI=0.01 Risk=2E-7	– –	No Action Necessary
	Resident: HI=0.00004		Resident: HI=0.24 Risk=4E-7	– –	No Action Necessary
Department 62 (Sumps and Trenches)	NR TRPH = NS	Remediation Complete	I. Worker: HI=0.043 Risk=8E-6	– Chromium (VI)=8E-6**	Achieved DTSC-approved cleanup goals
			Resident: HI=0.83 Risk=2E-5	– Chromium (VI)=2E-5**	Achieved DTSC-approved cleanup goals
Wastewater Treatment Plant	NR; TRPH = ND I. Worker: HI=0.0002	Remediation Complete	I. Worker: HI=0.13 Risk=4E-7	– –	No Action Necessary
	Resident: HI=0.0002		Resident: HI=1.2 Risk=8E-7	Copper=0.7** –	Achieved DTSC-approved cleanup goals
South Side Test Sites (Water Valves)	NR; TRPH = ND	No Action Necessary	NS	–	No Action Necessary
Metal Chip Storage Area	NR TRPH < 10 mg/kg	No Action Necessary	Soil Removed Entirely	–	No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected; NS = Not sampled; ND: Not detected

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

**Achieved the chromium (VI) DTSC-approved cleanup level of 5 mg/kg during remediation; and the copper DTSC-approved cleanup level of 2000 mg/kg.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 2A-Cooling Tower	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.014 Risk=1E-7	– –	No Action Necessary
			Resident: HI=0.12 Risk=3E-7	– –	No Action Necessary
Building 2B - Cooling Tower	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	Soil sampling indicated chromium concentrations do not exceed background		No Action Necessary
Building 3	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	Soil sampling indicated chromium concentrations do not exceed background		No Action Necessary
Building 3A - Compressor and Air Conditioning	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 3B - Cooling Tower	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	Soil sampling indicated chromium concentrations do not exceed background		No Action Necessary
Building 4A - Cooling Tower	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	Soil sampling indicated chromium concentrations do not exceed background		No Action Necessary

Note:
I. Worker = Industrial Worker; Resident = Hypothetical Resident
NR = No residual organic compounds detected.
NS = Not sampled.
TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration
*Risk relative to maximum concentration in soils not excavated.
-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
<u>Building 4</u> Old Machine Shop*	NR TRPH < 100 mg/kg	Remediation Complete (RWQCB, 1995b)	<u>I. Worker</u>: HI=0.08 Risk=1E-5	– Arsenic=9E-6 Beryllium=9E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			<u>Resident</u>: HI=1.3 Risk=8E-5	Arsenic HI=0.6 Arsenic=3E-6 Beryllium=5E-6	Risks within range of 1E-6 to 1E-4
Former R&D Lab Area (Chemistry Lab*)	NR TRPH = ND	Remediation Complete (RWQCB, 1995b)	<u>I. Worker</u>: HI=0.06 Risk=1E-5	– Arsenic=6E-6 Beryllium=7E-6	Risks within range of 1E-6 to 1E-4
			<u>Resident</u>: HI=1.0 Risk=9E-5	Arsenic=0.65 Arsenic=4E-5 Beryllium=5E-5	Risks within range of 1E-6 to 1E-4
Former R&D Lab Area - Sump	NR TRPH < 100 mg/kg	No Action Necessary	<u>I. Worker</u>: HI=0.013 Risk=5E-8	– –	No Action Necessary
			<u>Resident</u>: HI=0.22 Risk=1E-7	– –	No Action Necessary
Structural Test Lab	NR TRPH = ND	No Action Necessary	<u>I. Worker</u>: HI=0.036 Risk=8E-6	– Beryllium=7E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			<u>Resident</u>: HI=0.5 Risk=6E-5	– Beryllium=6E-5	Risks within range of 1E-6 to 1E-4
Original Process Lab Area* (former Plating Shop)	NR TRPH = ND	Remediation Complete (RWQCB, 1995b)	<u>I. Worker</u>: HI=0.024 Risk=1E-7	– –	No Action Necessary
			<u>Resident</u>: HI=0.33 Risk=2E-7	– –	No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected; NS = Not sampled; ND = Not detected.

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics: Overall Risk or Hazard Index (HI)	Organics: Recommended Risk Management Decision	Inorganics: Overall Risk or Hazard Index (HI)	Inorganics: Primary Contributor to HI>1 or Risk>1E-6	Inorganics: Recommended Risk Management Decision
Building 4 Old Photo Shop	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.019 Risk=3E-6	– Beryllium=3E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			Resident: HI=0.27 Risk=2E-5	– Beryllium=2E-5	No Action Necessary Risks within range of 1E-6 to 1E-4
Former Quench Tank	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.041 Risk=3E-6	– Arsenic=3E-6 Beryllium=3E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			Resident: HI=0.27 Risk=2E-5	– Beryllium=2E-5	Risks within range of 1E-6 to 1E-4
Building 4A - Compressor and Air Conditioning	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 4B (Centrifuge)	I. Worker: HI=0.000002 Risk=8E-10	No Action Necessary	–	–	No Action Necessary Mercury concentrations comparable to background levels
	Resident: HI=0.000002 Risk=2E-9 TRPH < 100 mg/kg				
Buildings 4C, 4D, 4E (Navy Phalanx Training Unit)	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected; NS: Not sampled; ND = Not detected.

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 4F - Cooling Tower	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Buildings 4U (Navy Phalanx Training Unit)	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 5	NS - Organics; TRPH = ND	No Action Necessary	NS		No Action Necessary
Building 6	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 7					
Four-Stage Clarifier Sump	NR; TRPH = ND	No Action Necessary	I. Worker: HI=0.044	–	No Action Necessary
			Resident: HI=0.37	–	No Action Necessary
Service Bay Containment Sump	NR; TRPH = ND	No Action Necessary	I. Worker: HI=0.002	–	No Action Necessary
			Resident: HI=0.039	–	No Action Necessary
Hydraulic Lift	NR; TRPH = ND	Remediation Complete (RWQCB, 1992)	NS		No Action Necessary
Building 9 Yard	NR; TRPH = ND	No Action Necessary	I. Worker: HI=0.009	–	No Action Necessary
			Risk=2E-7	–	
			Resident: HI=0.18	–	No Action Necessary
			Risk=3E-7	–	
Building 11 Area	NR; TRPH < 1000 mg/kg	No Action Necessary	I. Worker: HI=0.032	–	No Action Necessary
			–		
			Resident: HI=0.26	–	No Action Necessary
			–		
Building 12 (Scale)	NS - Organics; TRPH = ND	No Action Necessary	NS	–	No Action Necessary

Note:
I. Worker = Industrial Worker; Resident = Hypothetical Resident
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TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration
*Risk relative to maximum concentration in soils not excavated.
-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Buildings 14 and 14A	NS - Organics; TRPH = ND	No Action Necessary	I. Worker: HI=0.008	–	No Action Necessary
			Resident: HI=0.16	–	No Action Necessary
Building 15					
Area A	NR TRPH < 1000 mg/kg	No Action Necessary	I. Worker: HI=0.01 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.21 Risk=4E-7	– –	No Action Necessary
Area B	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.022 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.5 Risk=4E-7	– –	No Action Necessary
Building 21	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 24	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 27*	TRPH = ND I. Worker: HI=0.00001 –	Remediation Complete (RWQCB, 1995b)	I. Worker: HI=0.05 Risk=8E-6	– Arsenic=5E-6 Beryllium=3E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
	Resident: HI=0.00003 –		Resident: HI=0.8 Risk=5E-5	– Arsenic 3E-5 Beryllium=2E-5	Risks within range of 1E-6 to 1E-4

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected; NS: Not sampled.

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 28	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 30 Septic Tanks	NR TRPH < 1000 mg/kg	No Action Necessary	I. Worker: HI=0.009 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.2 Risk=5E-7	– –	No Action Necessary
Chemical Holding Tanks	NR; TRPH = ND	Closure report accepted by RWQCB (1993)	I. Worker: HI=0.002 –	–	No Action Necessary
			Resident: HI=0.04 –	–	No Action Necessary
Other Areas	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 31	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 32	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 33	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected; NS = Not sampled; ND = Not detected

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 34	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 35	NS - Organics; TRPH = ND	No Action Necessary	NS	–	No Action Necessary
Building 36	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 37	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 38	NR TRPH < 10 mg/kg	Demolished; Closure report accepted by RWQCB (1993)	NS	Closure report accepted by RWQCB (1993)	
Building 39	NR TRPH < 10 mg/kg	Demolished; Closure report accepted by RWQCB (1993)	NS	Closure report accepted by RWQCB (1993)	
Building 40	NR TRPH = ND	Demolished No Action Necessary	NS	–	No Action Necessary
Building 41	NR TRPH < 100 mg/kg	Demolished No Action Necessary	NS	–	No Action Necessary
Building 42 (Antenna Range)	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.03 Risk=8E-8	– –	No Action Necessary
			Resident: HI=0.5 Risk=2E-7	– –	No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

NR = No residual organic compounds detected.

NS = Not sampled.

TRPH, TPH = Total Recoverable or Total Petroleum Hydrocarbon concentration

*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Building 43	NR	No Action Necessary	I. Worker: HI=0.14 Risk=6E-6	– Arsenic=6E-6	No Action Necessary Risks within range of 1E-6 to 1E-4
			Resident: HI=0.67 Risk=4E-5	– Arsenic=4E-5	No Action Necessary Risks within range of 1E-6 to 1E-4
Building 45	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 46	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)	No Action Necessary	No releases to the environment identified during Phase I Investigations (Versar, 1994; Woodward-Clyde, 1994)		No Action Necessary
Building 48 Bulk Chemical Storage Area	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.055 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.98 Risk=4E-7	– –	No Action Necessary
Storage Bays	NR TRPH = ND	No Action Necessary	I. Worker: HI=0.04 –	– –	No Action Necessary
			Resident: HI=0.66 –	– –	No Action Necessary
Building 301 Septic Tanks	NR TRPH < 1000 mg/kg	No Action Necessary	I. Worker: HI=0.007 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.1 Risk=4E-7	– –	No Action Necessary

Note:

I. Worker = Industrial Worker; Resident = Hypothetical Resident

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*Risk relative to maximum concentration in soils not excavated.

-: Not applicable.

Table ES-1

Post-remediation Risk Summary

Investigative Area	Organics		Inorganics		
	Overall Risk or Hazard Index (HI)	Recommended Risk Management Decision	Overall Risk or Hazard Index (HI)	Primary Contributor to HI>1 or Risk>1E-6	Recommended Risk Management Decision
Overpass	NR TRPH < 1000 mg/kg	No Action Necessary	I. Worker: HI=0.05 Risk=6E-8	– –	No Action Necessary
			Resident: HI=0.5 Risk=1E-7	– –	No Action Necessary
Salvage Yard (Metal Chip Storage)	NR TRPH < 100 mg/kg	Remediation Complete	NS	–	Removal Action Complete
Pomona Recreation Association (PRA) Area	NS - Organics TRPH < 100 mg/kg	No Action Necessary	I. Worker: HI=0.05 Risk=2E-7	– –	No Action Necessary
			Resident: HI=0.6 Risk=4E-7	– –	No Action Necessary

Note:
I. Worker = Industrial Worker; Resident = Hypothetical Resident
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NS = Not sampled.
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*Risk relative to maximum concentration in soils not excavated.
-: Not applicable.